

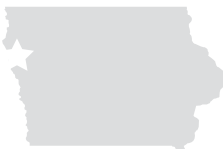


2007 SIX-MONTH INTERNSHIP  
GELITA USA INC.

COMPANY BACKGROUND

GELITA USA Inc., Sioux City manufactures gelatin, which is sold worldwide and is used in a variety of applications in the food, photographic, and pharmaceutical industries. The facility utilizes both pork skins and bone chips as raw materials. The Sergeant Bluff facility serves as the headquarters for GELITA North America Inc. and is the largest single-site gelatin producer in the world. GELITA North America has two additional facilities. The firm is a subsidiary of GELITA AG (Germany) which also has regional operations in Europe, South America, Australia, New Zealand and China.

SIoux CITY



ANNE GRABER  
CHEMICAL ENGINEERING  
IOWA STATE UNIVERSITY

PROJECT BACKGROUND

GELITA currently discharges their wastewater to the Sioux City Wastewater Treatment Plant. With their current treatment system, which includes a series of five lagoons encompassing almost 115 acres, they are unable to meet the requirements to obtain permits to discharge directly to the Missouri River. The company would like to be able to improve their effluent enough to discharge to the river and reduce the land area of the lagoons. GELITA-Sioux City is the first company in Iowa to participate in the new six-month internship.

INCENTIVES TO CHANGE

Gelatin production results in the creation of large amounts of wastewater. The cost of water treatment at the treatment plant has risen substantially and will likely continue to rise. The stricter wastewater regulations and the growth of the company have caused the original wastewater treatment methods to become insufficient, resulting in large costs to the company. Several areas of the plant have the potential to utilize new technology

to help reduce the cost of wastewater treatment while helping to prevent pollution.

RESULTS

*Aeration Basin:* The aeration basin is the first cell of the lagoon system. This cell currently uses coarse bubble aeration to increase the level of dissolved oxygen in the water. Several tests were conducted to determine the opportunity to improve the operation of the cell by switching to fine bubble aeration. The tests included monitoring the efficiency of the current system, pilot studies of different types of aeration, and a simulation of the cell using the new aeration. The results of these tests suggested GELITA should switch to fine bubble aeration to decrease the cost of wastewater treatment and electricity.

*Aeration Pond:* The aeration pond is the fourth cell of the lagoon system. This cell provides the opportunity to nitrify and denitrify the wastewater to decrease ammonia levels. Although GELITA does not currently pay for their ammonia levels in the wastewater treatment process, the charges will begin within the next few years. New aeration techniques along with other technology will be required. Ammonia is difficult to remove from wastewater so it is difficult to predict the results that will occur from the planned changes. However, the new

system in conjunction with the Aeration Basin Project may allow GELITA to discharge their wastewater directly to the Missouri River. A pilot trial will be required before this project can be recommended.

*Diatomaceous Earth:* DE is used for filtration within the plant and currently no recovery system exists for the DE. This results in added solids to the wastewater and complicates the by-product recovery process in several ways. The opportunity to recover and reuse the DE has been researched. Approximately 25% of the DE could be reused in a year resulting in both monetary savings and non-quantifiable savings in the wastewater and by-product recovery systems. More research is needed to ensure the reused DE has no effect on product quality.

*Solid Waste Recycling:* Many materials used at the plant can be recycled. Bulk bags, fiber drums, combos, and cardboard were the main materials identified for beginning a recycling program. By recycling these items GELITA will save money on landfill fees and can generate revenue from the sale of the materials.

Air Pollutants Diverted in Tons

	Total for all sectors
SO2	9.745
CO	0.998
NOX	4.629
VOC	0.161
PM	0.241

Green House Gases Diverted in Tons (CO2 Equivalent)

	Total for all sectors
CO2	1801.294
CH4	67.729
N2O	0.902
CFCS	22.156



PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
AERATION BASIN IMPROVEMENTS	\$237,000	1,921,278 KWH	RECOMMENDED
AERATION POND IMPROVEMENTS	\$630,000	—	MORE RESEARCH NEEDED
DIATOMACEOUS EARTH RECOVERY AND REUSE	\$38,000	—	MORE RESEARCH NEEDED
SOLID WASTE RECYCLING	\$5,500	94 TONS	RECOMMENDED